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TM-970 002 00

JOVIAL-X 2. The Language of the One Pass JOVIAL Compiler

TM-970/002/00

TECHNICAL MEMORANDUM

(TM Series)

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JOVIAL-X.2, The Language of the
One Pass JOVIAL Compiler

by

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JOVIAL-X.2, The Language of the One Pass JOVIAL Compiler

J-X.2 has been obtained by choosing a subset from the intersection of the J2 and J3 languages. In the main, the subset has been formed by deleting from the intersection, features which would slow the compilation process and/or were not vital in such programming areas as compiler writing. Since in many respects J2 is a subset of J3, J-X.2 is much closer to J2.

The authors of the compiler have tried to the best of their understanding to make J-X.2 a subset of J2 and J3. At the present time they know of only one exception. This exception is due to an incompatability between J2 and J3 and will be noted later.

The features that have been deleted are in general:

1. Fixed point computation. All computation is done by integer or floating point arithmetic. This is perhaps the most critical deletion. Instead of a fixed item description, use the integer form, i.e.,
   ITEM XX I 36 U $

2. All functional modifiers. BIT, BYTE, CHAR, MANT, ODD, ALL, POS, ENTRY, NENT, NWDSEN.

3. Input/Output. All input/output must be done via procedures as in J2 (7090).

4. Unspecified table declarations. All tables must be bit-specified. All tables are parallel, regardless of the specification in the declaration, e.g.:

```
TABLE  DRQ  V  25  P  2  $
  BEGIN  DRQA  I   3  U  0  18  M  $
         DRQB  I  15  U  0   3  M  $
         DRQC  I  15  U  1   3  M  $
         DRQD  I  15  U  0  21  M  $
         DRQE  I   8  U  1  21  D  $
         DRQF  I   7  U  1  29  D  $
  END
```

5. Status, dual and Boolean variables and constants.

6. Literal variables and constants, greater than one word in length, e.g.:

   ITEM NAME H 84 P 16H(THIS IS TOO LONG) $

7. MODE, STRING, FILE, DEFINE and OVERLAY declarations. The normal mode is integer, signed.

8. Labels may not exceed 6 characters nor contain a prime (').

9. Transmission code literals.

10. CLOSE statements.

11. Entry variables.

12. Item switches.

13. Switches or CLOSE's as switch branch points, or empty switch positions, e.g.:

```
SWITCH  TRAIN  =  (S1,,S2,,SW($I$))$
```

This is not a legal J-X.2 switch because SW (I) appears as a branch point and it contains empty positions.

14. Exchange statements.

A more detailed description of the J-X.2 language is provided in the attached chart which compares J3, J2 and J-X.2 by examining each form of TM-555/002/01. This comparison describes J2 and J-X.2 as subsets of J3. Where J2 and J-X.2 are the same as J3 for a given form, the comment "Same" will be in the appropriate columns. Where J2 differs from J3 and J-X.2 is the same as J2, the comment "Same as J2" will appear. In case of differences, a brief comment will appear which will only outline the differences. For a more detailed explaination of these points see TM-555/002/01 for J3, FN-6223/100/00 for J2 and TM-970/005/00 for J-X.2 (the latter is being prepared).

The exception that prevents J-X.2 from being an exact subset, previously refered to, is the use of table names. J-X.2 allows the use of an unsubscripted table name to represent the location of the table--as in J2. This is of course illegal in J3. J-X.2 also allows the use of a table name as a formal parameter which is illegal in J2. (See form 40 and 116 in the following chart.)

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
1	Letter	Same	Same
2	Numeral	Same	Same
3	Mark	No '	No '
4	Sign	Same	Same
5	Arithmetic Operator	** for exponentiation ABS for absolute value	Same as J2
6	Relational Operator	Same	Same
7	Logical Operator	Same	Same
8	Sequential Operator	No IFEITH or ORIF	No IFEITH, ORIF, or CLOSE
9	File Operator	None	None
10	Functional Modifier	No CHAR, MANT, ODD, POS, ENT instead of ENTRY	None except A (used with ASSIGN)
11	Separator	No ' or ...	No == or ' or ...
12	Bracket	ABS instead of (/ /)	Same as J2
13	Declarator	No MODE, FILE, DEFINE or OVERLAY	No MOD, STRING, FILE, DEFINE, or OVERLAY
14	Abbreviations	No B	No A, B, D, L, T or V
15	Label	6 characters, no '	Same as J2
16	itemname	No bname, dname	Same as J2
17	fname	Same	Same
18	aname	Same	Integer only
19	dname	None	None
20	lname	Same	Same
21	sname	Same	None

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
22	bname	None	None
23	tablename	Same	Same
24	filename	None	None
25	statementname	Same	Same
26	switchname	Same	Same
27	procedurename	Same	Same
28	Constant	No dcon, bcon	No acon, dcon, bcon
29	n	Same	Same
30	icon	Same	Same
31	fcon	Same	Same, must start with digit, i.e., 0.1E4 not .1E4
32	acon	No negative precision	None
33	ocon	Same	n (six or less) must precede 0, i.e., 40(1224)
34	dcon	None	None
35	lcon	Six characters or less	Six characters or less. No T. The number of characters in the constant must be equal to the number of characters in the item, e.g., ITEM XX H 5 P 5H(ABC) $ NOT ITEM XX H 5 P 3H(ABC) $
36	bcon	None	None
37	status	Six character labels or less	None
38	comment	Same	Same
39	variable	No bvar	No svar,bvar, entvar

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
40	avar	a) A tablename without subscripts represents the location of the table. This form is illegal in J3. b) A table item without subscripts represents the 0th entry, e. g., XX represents the XX (0) entry. This form is illegal in J3.	A Table name without subscripts represents the location of the table. This form is illegal in J3. No dname or fixed. Integer only.
41	avar: Subscript	Same	Same
42	avar: BIT	Same	None
43	avar: CHAR, MANT	None	None
44	avar: POS	None	None
45	avar: NENT	Same	None
46	lvar	Six characters or less	Same as J2
47	lvar: BYTE	Same	None
48	svar	Same	None
49	bvar	None	None
50	bvar: ODD	None	None
51	entvar	Uses ENT	None
52	formula	No bform	No sform, bform
53	function	No statement name as an output parameter	Same as J2
54	aform	No dcon	No acon, dcon
55	aform: NWDSEN	Same	None

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
56	aform	ABS (aform) instead of (/ aform /).	ABS (aform) instead of (/ aform /). Only floating point and integer computations are performed. No modifiers
57	index	Same	Same
58	lform	Six characters or less	Six characters or less. No T.
59	sform	Same	None
60	bform	None	None
61	bform: aform	Same	Same except no multi-relationals
62	bform: lform	Same	Same except no multi-relationals
63	bform: svar	No filename	None
64	bform: entvar	Same	None
65	bform: AND, OR, NOT	Same	Same
66	entform	Uses ENT	None
67	seqform	Same	No item switches
68	statement: named	Same	Same
69	compound	Same	Same
70	assignment: avar	Same	Same
71	assignment: lvar	Same	Same
72	assignment: svar	Same	None
73	assignment: bvar	None	None

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
74	assignment: entvar	Same	None
75	==	No BIT	None
76	==	No BYTE	None
77	==	Same	None
78	==	None	None
79	==	Same	None
80	GOTO	Same	Same
81	IF	No bvar	Same as J2
82	FOR : 1 factor	Same	Same
83	FOR : 2 factor	Same	Same Same The step factor may have a negative sign, but the expression being signed must be positive. The subscript is decremented only if the step factor is preceded by the - sign. It is incremented if the sign is + or missing, i.e., FOR I = 10, -A, 1 $ A may never have a negative value. FOR I = 10, B, 1 $ This statement will not work because I will be incremented by B.
84	FOR : 3 factor	Same	
85	FOR : ALL	Same	No Parallel FOR Statement. None
86	TEST	Same	Same

J-3 TM-555/002/01		J-2 (7090) FN-10-6223/100	JOVIAL-X.2
Form	Description		
87	CLOSE	Compound Statement only	None
88	RETURN	Same	Same
89	STOP	Same	No statement name
90	Alternative	None	None
91	Procedure	a. No statement name as an output parameter. b. No table name as an output parameter.	No statement name as an output parameter
92	DIRECT	Same	Same. Note: Each compiler has different rules for handling direct code.* The J-X.2 Compiler treats the symbolic address as if it were an item name, e.g., CLA XYZ XYZ would be given the location of the item XYZ if it were in a ITEM declaration. If the direct code and the ITEM declaration were in a procedure, the location would be the same as the local variable.
93-96	Input-Output	None	None
97	Floating Item	No R or Range	No R or Range
98	Fixed Item	No R or Range, no negative precision	No fixed, only the integer form I n S;U
99	Dual Item	None	None

* See Appendix

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
100	Literal Item	Six characters or less	No T. Six characters or less
101	Status Item	Number of bits is not optional	None
102	Boolean Item	None	None
103	Parameter	Same	No status or array parameter
104	ITEM	Same	Same
105	Parameter ITEM	The item may <u>not</u> be set, that is, used on the left side of an assignment statement or as an output parameter	The ITEM description <u>must</u> be present. The item may <u>not</u> be set, that is, used on the left side of an assignment statement or as an output parameter.
106	MODE	None	None
107	OVERLAY	None	None
108	TABLE-Unspecified	Same. Number of bits in STATUS item may <u>not</u> be used.	None
109	TABLE-Specified	Same. Number of bits in STATUS item is required	No Strings. No Serial Entries. N, M or D must be given
110	Like	No N, M, D	None
111	ARRAY	No parameters	No parameters
112	SWITCH-numeric	No SWITCH or CLOSE as branch point	No SWITCH or CLOSE as branch point. No empty positions.
113	SWITCH-item	No SWITCH or CLOSE or file-name as branch point	None
114	DEFINE	None	None

J-3 TM-555/002/01		J-2 (7090) FN-LO-6223/100	JOVIAL-X.2
Form	Description		
115	FILE	None	None
116	PROC	No tablename as a formal parameter. Since a table name can be used as an actual input parameter, its corresponding formal parameter must be simple variable. This is illegal and unconsistent with the J3 form. No statement name as an output parameter	No statement name as an output parameter. Since a table name can be used as a formal parameter, as in J3, this form is illegal in J2
117	Program	Same	Same, except statement name must follow TERM

APPENDIX

7090 DIRECT CODE LANGUAGE

COLUMN	1-6	8-12	11,12	> 12			> 30
FIELD	SYMBOL	OPCODE	INDIRCT ARD	ADDRESS ,	TAG,	DECREMENT	COMMENTS
	1) Label 2) Blank	1)Mnemonic Machine Operations 2) BSS 3) ØRG 4) PZE	1) *	1) Label 2) Label + Constant 3) = Label 4) Constant 5) = Constant 6) * 7) * * 8) * + Constant 9) + Constant 10) Blank	Integer Constant	Constant + Constant **	

NOTE: 1) Labels must be written in the form accepted by J-X.2. They can be the same as labels used in the J-X.2 coding, such as:

```
BLIST=  1  $
DIRECT     $
PSE     116
STZ     BLIST
JOVIAL
```

2) Constants must be written in the form accepted by J-X.2, such as:

```
CAL   =2H(AB)
SUB   =0.32E-4
STO    1589
CAL   =2Ø(77)
STW   =XYZ+9
```

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CURRENT MODIFICATION

Modified Pages

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10
11

ERRATA* Please change the heading on line one, column two of pages 3-11 to read FN-6223/100/00.

*ERRATA modifications are to be made by hand.

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System Development Corporation,
Santa Monica, California
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